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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,424	04/05/2005	Fumitomo Yamasaki	10873.1668USWO	6685

23552 7590 08/18/2006

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EXAMINER	
RIVERO, MINERVA	
ART UNIT	PAPER NUMBER
2627	

DATE MAILED: 08/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/530,424	YAMASAKI ET AL.	
	Examiner	Art Unit	
	Minerva Rivero	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims 1-2, 7-15

4)☒ Claim(s) ~~1-15~~ is/are pending in the application.

4a) Of the above claim(s) ~~____~~ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) *1~~4~~ and 7-1~~5~~* is/are rejected.

7)☒ Claim(s) *2 and 15* is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: ____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Allowable Subject Matter

2. Claims 2 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 2, the combined teachings of Akihiro and Hiroyuki do not disclose nor fairly suggest tilt detection means for detecting the relative inclination between the objective lens and the information recording medium,

wherein the interval between the second and third splitting lines is narrower than the width, in the longitudinal direction of the information track of the information recording medium, of the region in which 0-order light and ±1-order light that are diffracted at the information track of the information recording medium are superimposed; and

wherein the tilt detection means compares the phase of the first push pull signal obtained by calculating signals detected by receiving light fluxes created by laser light passing through the two regions that are disposed between the second and third splitting lines, and of a second push pull signal obtained by calculating signals detected by receiving light fluxes created by laser light passing through the entire region of the light splitting means, to generated a tilt error signal for detecting the relative inclination between the objective lens and the information recording medium.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 7-10, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akihiro *et al.* (JP-11-73658), hereinafter Akihiro, in view of Hiroyuki *et al.* (JP 2002-157756), hereinafter Hiroyuki.

5. Regarding claim 1, Akihiro discloses an optical head, comprising:

a light source for radiating laser light ([0016], Line 2);

an objective lens for focusing the laser light that is radiated from the light source onto an information recording medium ([0015], Line 1);

light splitting means for spatially dividing the laser light that is reflected by the information recording medium and that passes through the objective lens into a plurality of light fluxes (Col. 8, Lines 41-42; see Fig. 9, element 58);

a light receiving element for receiving the plurality of light fluxes divided by the light splitting means ([0016], Line 7);

tracking error signal detection means for detecting a tracking error signal based on the plurality of light fluxes received by the light receiving element ([0016], Line 9);

wherein the light splitting means has six regions that are divided by a first splitting line that is substantially parallel to a longitudinal direction of an information track formed on the information recording medium, and second and third splitting lines arranged in parallel that are substantially perpendicular to the first splitting line, and that are substantially symmetrical about the optical axis of the objective lens ([0017], Lines 3-5; see Figs. 19(a) and 19(b));

wherein the tracking error signal detection means generates a first push pull signal by calculating signals detected by receiving light fluxes created by laser light passing through those two of the six regions that are disposed between the second and third splitting lines, and generates a signal for correcting the offset of the first push pull signal caused by movement of the objective lens by calculating signals detected by receiving light fluxes created by laser light passing though those four of the six regions

that are disposed on the outer side of the second and third splitting lines ([0007], full paragraph);

light splitting means divides the laser light that passes through the two regions that are disposed between the second and third splitting lines into a first plurality of ±1-order diffracted light, and divides the laser light that passes through the four regions that are disposed on the outer side of the second and third splitting lines into a second plurality of ±1-order diffracted light ([0006], Lines 1-3; [0016], Lines 4-7; [0017], Lines 3-5); and

the light receiving element has a first plurality of light receiving regions, divided into three, that divides the first plurality of ±1-order diffracted light into three and receives that light, and a second plurality of light receiving regions, divided into three, that divides the second plurality of ±1-order diffracted light into three and receives that light (*photodetectors*, [0017], Lines 3-5, see Fig. 15, elements 10a-c and 11a-c);.

However, Akihiro does not explicitly disclose but Hiroyuki does disclose a first focal point shift amount obtained by detecting the size of a light spot formed by focusing the light fluxes created by laser light passing through two regions that are disposed between the second and third splitting lines, onto the light receiving element, and a second focal point shift amount obtained by detecting the size of a light spot formed by focusing the light fluxes created by laser passing through the four regions, which are disposed on the outer side of the second and third splitting lines onto the light receiving element, to generate a spherical aberration correction signal for detecting the spherical aberration generated at the objective lens ([0166]-[0170]).

Therefore it would have been obvious to one ordinarily skilled in the art at the time of the invention to modify the teachings of Akihiro and have the spherical aberration detection means compare a first focal point shift amount obtained by detecting the size of a light spot formed by focusing the light fluxes created by laser light passing through two regions that are disposed between the second and third splitting lines, onto the light receiving element, and a second focal point shift amount obtained by detecting the size of a light spot formed by focusing the light fluxes created by laser passing through the four regions, which are disposed on the outer side of the second and third splitting lines onto the light receiving element, to generate a spherical aberration correction signal for detecting the spherical aberration generated at the objective lens, as disclosed by Hiroyuki, in order to obtain a more precise spherical aberration measure, as further disclosed by Hiroyuki ([0170]).

6. Regarding claims 7 and 12, Hiroyuki discloses a signal indicating the first focal point shift amount is SAE2, and the signal indicating the second focal point shift amount is SAE1, and the spherical aberration correction signal SAE is expressed by;

SAE = SAE2 – k*SAE1,

(where k is a constant that substantially satisfies k = SAE2/SAE1 when there is no spherical aberration and when the focal point shift amount is within a predetermined range) ([0058], Line 60); and

a control circuit for adding an electrical offset to a focus error signal to create a predetermined focal point shift, and determining the constant k such that fluctuations of

the spherical aberration correction signal SAE = SAE2 – k*SAE1 in a range of the predetermined focal point shift are contained within a predetermined range ([0058], Line 60).

Therefore it would have been obvious to one ordinarily skilled in the art at the time of the invention to supplement the teachings of Akihiro and have a signal indicating the first focal point shift amount is SAE2, and the signal indicating the second focal point shift amount is SAE1, and the spherical aberration correction signal SAE is expressed by SAE = SAE2 – k*SAE1, (where k is a constant that substantially satisfies k = SAE2/SAE1 when there is no spherical aberration and when the focal point shift amount is within a predetermined range) and a control circuit for adding an electrical offset to a focus error signal to create a predetermined focal point shift, and determining the constant k such that fluctuations of the spherical aberration correction signal SAE = SAE2 – k*SAE1 in a range of the predetermined focal point shift are contained within a predetermined range, in order to offset spherical aberration and maintain an amount of spherical aberration within a desired predetermined range.

7. Regarding claim 8, Akihiro discloses the light splitting means includes a polarizing hologram ([0023], Line 13).

8. Regarding claim 9, Akihiro discloses the light-receiving element is an integrated light receiving/emitting element that is configured as a single unit with the light source (see Fig. 14).

9. Regarding claim 10, Akihiro discloses the light-receiving element is an integrated optical element in which the light source and the light splitting means are configured as a single unit (see Fig. 14).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akihiro in view of Hiroyuki, further in view of Yasuda *et al.* (US Patent 6,661,415), hereinafter Yasuda.

Regarding claim 11, Yasuda discloses a liquid crystal element provided between the objective lens and the light splitting means (Col. 10, Lines 31-36; see Fig. 13, *beam splitter* 22, *liquid crystal element* 24 and *objective lens* 27), and

spherical aberration correction means for correcting the spherical aberration by changing the phase of wave fronts that pass through the liquid crystal element due to the application of a voltage in accordance with the spherical aberration correction signal created by the spherical aberration detection means (Col. 3, Lines 34-36; see Figs. 12A-12C)

Therefore it would have been obvious to one ordinarily skilled in the art at the time of the invention to supplement the combined teachings of Akihiro and Hiroyuki and have a liquid crystal element provided between the objective lens and the light splitting means and spherical aberration correction means for correcting the spherical aberration by changing the phase of wave fronts that pass through the liquid crystal element due to

the application of a voltage in accordance with the spherical aberration correction signal created by the spherical aberration detection means, in order to effect tilt correction by appropriately changing the phase difference of a transmitting laser beam.

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akihiro in view of Hiroyuki, further in view of Yasuda, further in view of Yagi *et al.* (US 5,754,513), hereinafter Yagi.

Regarding claim 13, the combined teachings of Akihiro and Hiroyuki do not explicitly disclose but Yasuda does disclose a collimator lens, provided between the objective lens and the light splitting means, that converts the laser light radiated from the light source to substantially parallel light (Col. 10, Lines 33-34, see Fig. 13 element 23).

Therefore it would have been obvious to supplement the combined teachings of Akihiro and Hiroyuki and have a collimator lens, provided between the objective lens and the light splitting means, that converts the laser light radiated from the light source to substantially parallel light, as disclosed by Yasuda, in order to collect the rays parallelly.

Moreover, the combined teachings of Akihiro, Hiroyuki and Yasuda do not explicitly disclose but Yagi does disclose spherical aberration correction means for correcting the spherical aberration by moving the collimator lens in the direction of the

optical axis of the laser light, in accordance with the spherical aberration correction signal created by the spherical aberration detection means (Col. 57, Lines 33-40).

Therefore it would have been obvious to one ordinarily in the art to supplement the combined teachings of Akihiro, Hiroyuki and Yasuda, and have spherical aberration correction means for correcting the spherical aberration by moving the collimator lens in the direction of the optical axis of the laser light, in accordance with the spherical aberration correction signal created by the spherical aberration detection means, as disclosed by Yagi, in order to offset spherical aberration.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hayashi *et al.* (US 5,790,504) disclose an integrated optical head with an emitting light splitting polarizing prism and a detecting light splitting polarizing element.

Tezuka *et al.* (US 6,185,166) disclose an optical information recording apparatus including a four region light splitting prism.

Yang *et al.* (US 5,568,457) disclose an optical pickup system using a hologram device and a Wollaston prism.

Yang (US 5,644,563) discloses an optical pickup system that includes a polarized beam splitter.

Kubo *et al.* (US 6,567,353) disclose an optical head device with light receiving element surfaces divided into a minimum of three light receiving areas.

Mori *et al.* (US 6,909,687) disclose an optical pickup with a diffraction element consisting of six regions providing spatial variation corresponding to a focus state.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minerva Rivero whose telephone number is (571) 272-7626. The examiner can normally be reached on Monday-Friday 9:00 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

8/9/06

WAYNE YOUNG
SUPERVISORY PATENT EXAMINER